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Pig feed ingredients and feed cost in Kampong Thom, Siem Reap, and Battambang Province, Cambodia

Prof. Dr. Kang Kroesna, Dean of Faculty of Veterinary Medicine,
RUA, Cambodia

Dr. Joel DeRouchey, Swine Nutritionist, Kansas State University



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SESSION OUTLINE

1. Background on Cambodia swine farmer survey
2. Nutrition of the pig - what does the pig require in a diet
3. Analysis of Cambodia feed ingredients
4. Swine nutrition experiment results
5. Take home points





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CAMBODIA FARMER SURVEY

- 225 Farmers – Questions on feed ingredients, disease and biosecurity
- 45 Feed stores
- 45 Village Animal Health Workers
- Conducted in 2017 and 2018
- In Battaambang, Kampong Thom, and Siem Reap



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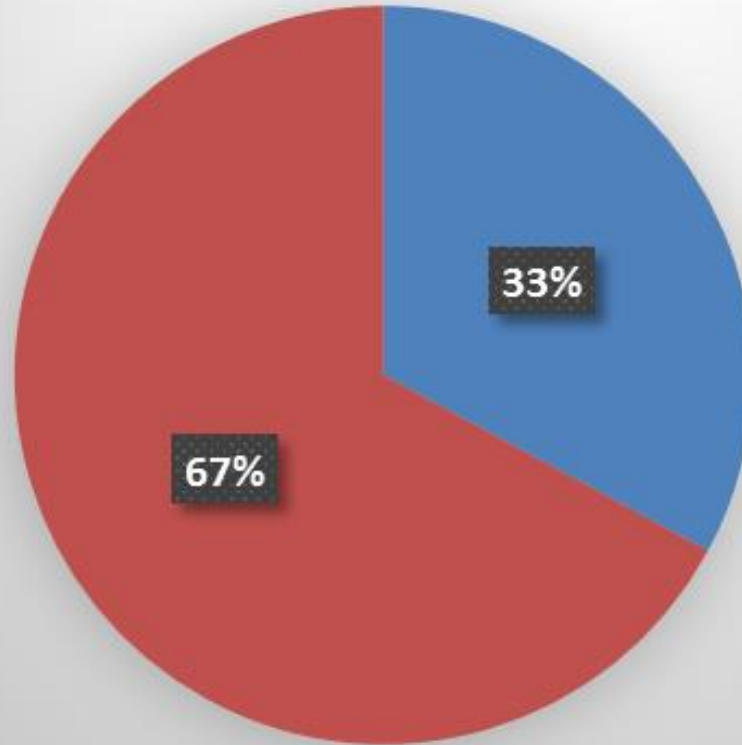


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នៃការសំភាសន៍
កសិករ ២២៥នាក់

Interviewee



- Male
- Female



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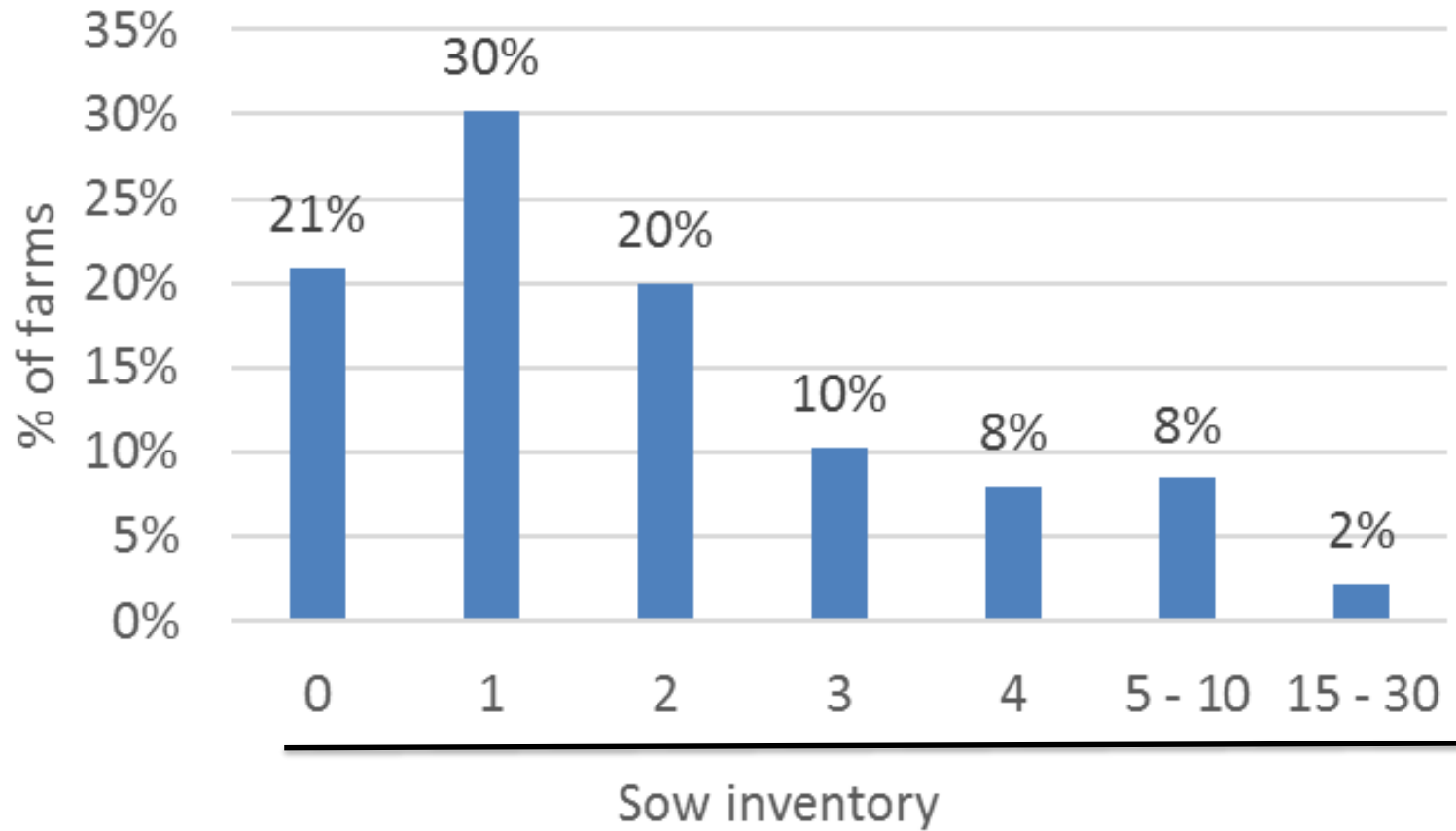
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How many sows do you currently own?

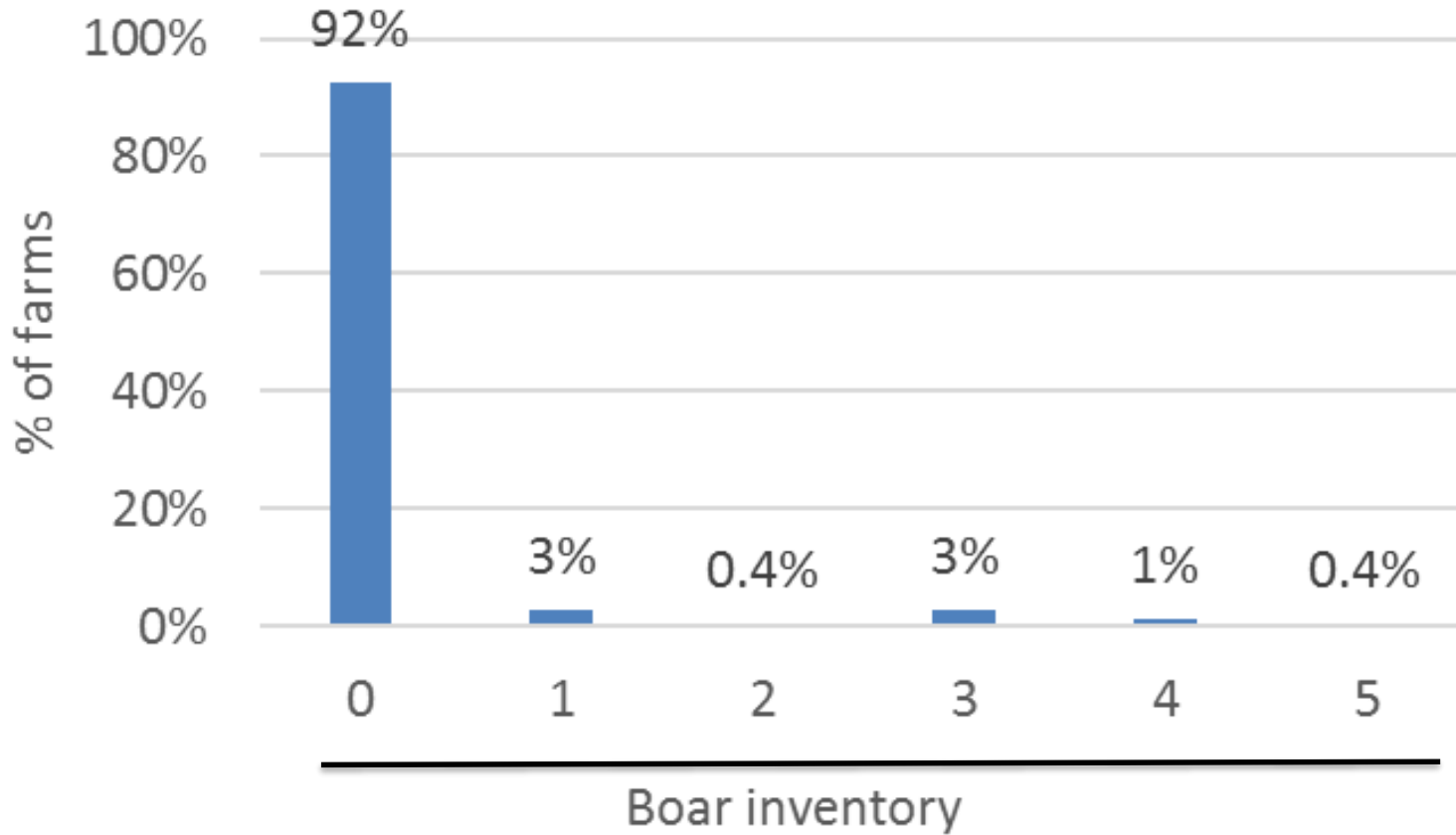




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How many boars do you currently own?



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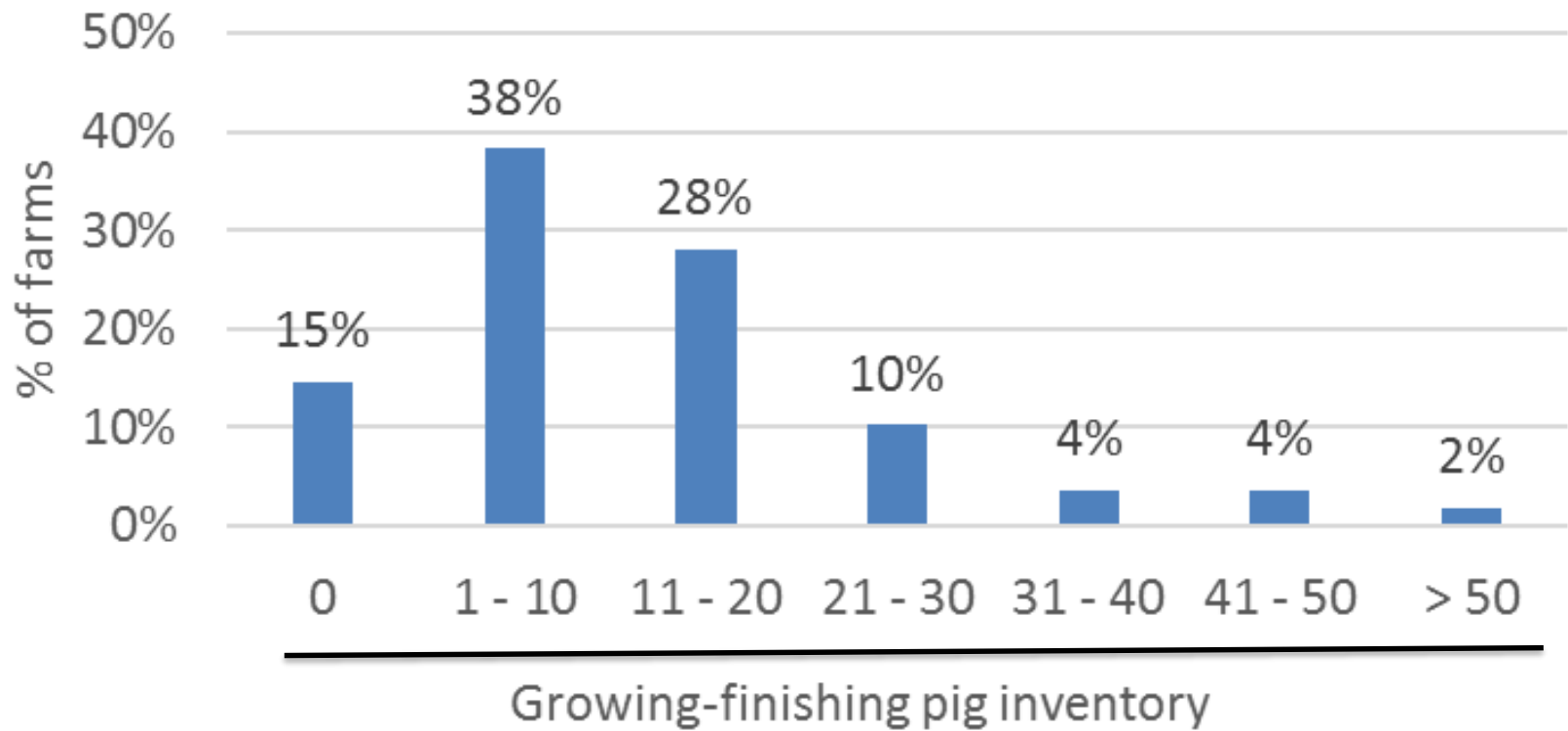
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How many growing-finishing do you currently own?



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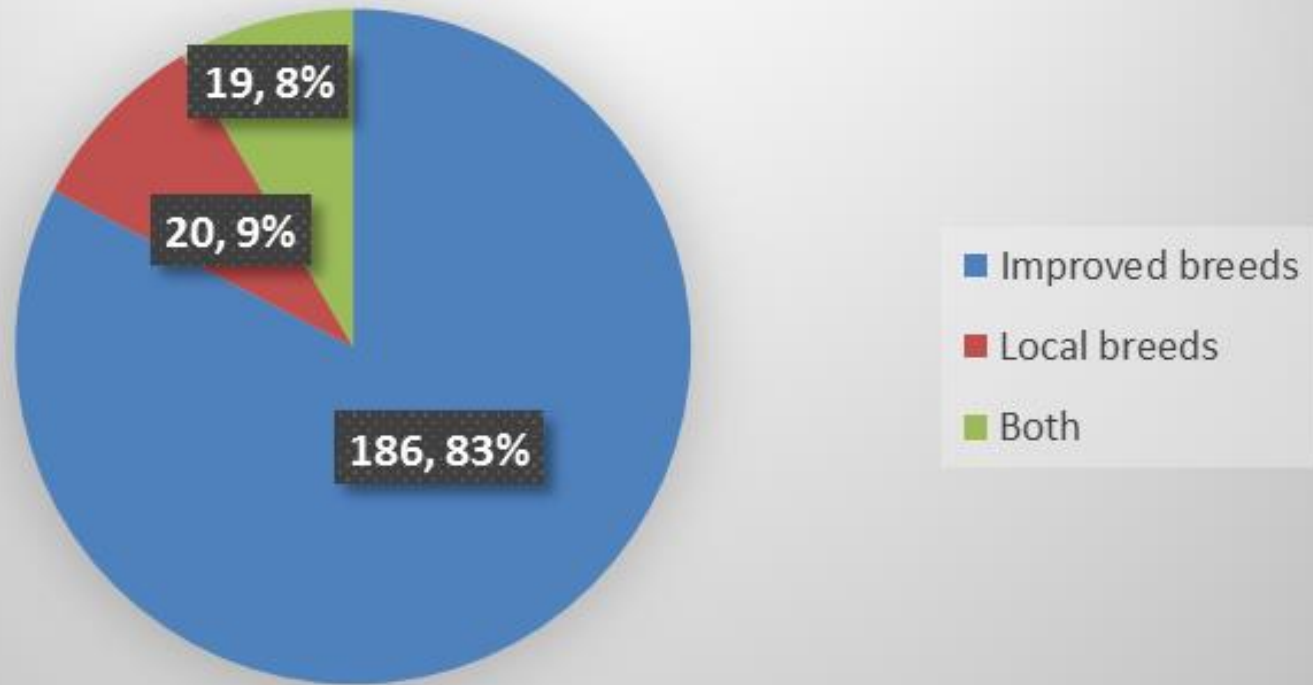
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What is the genetic background of your pigs?





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No major differences in results between the three provinces



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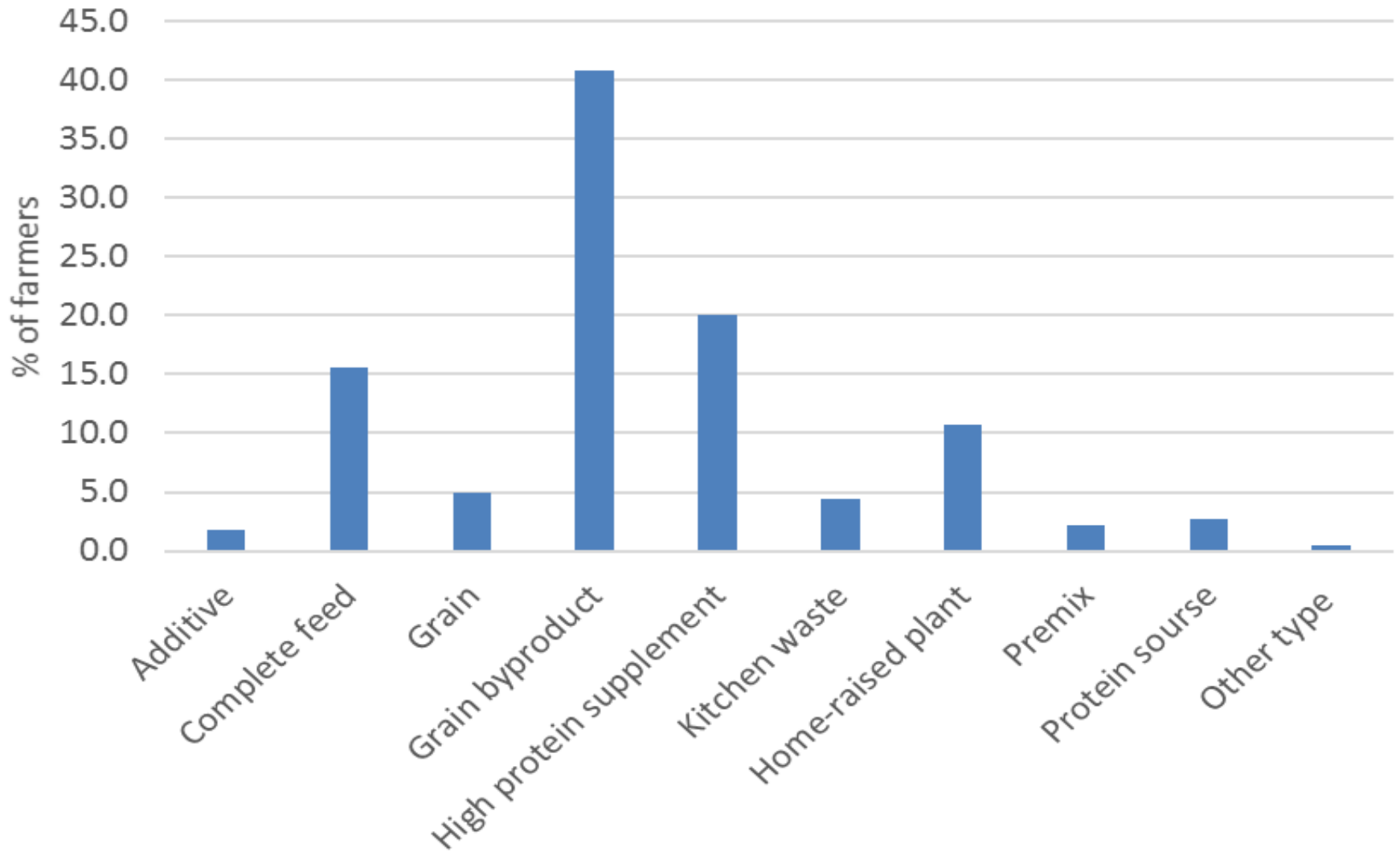
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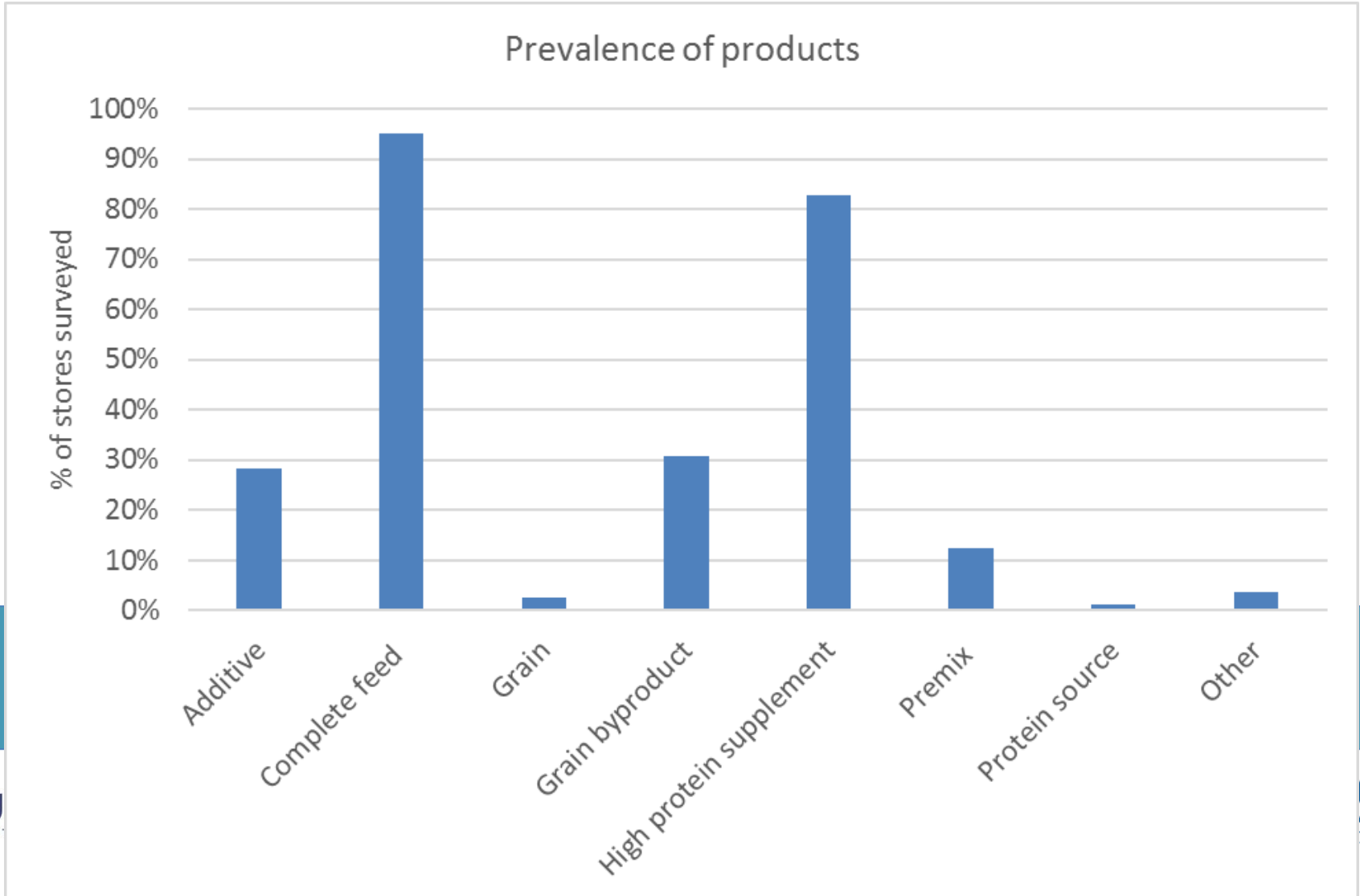
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Prevalence of ingredients among farmers





Products at feed stores

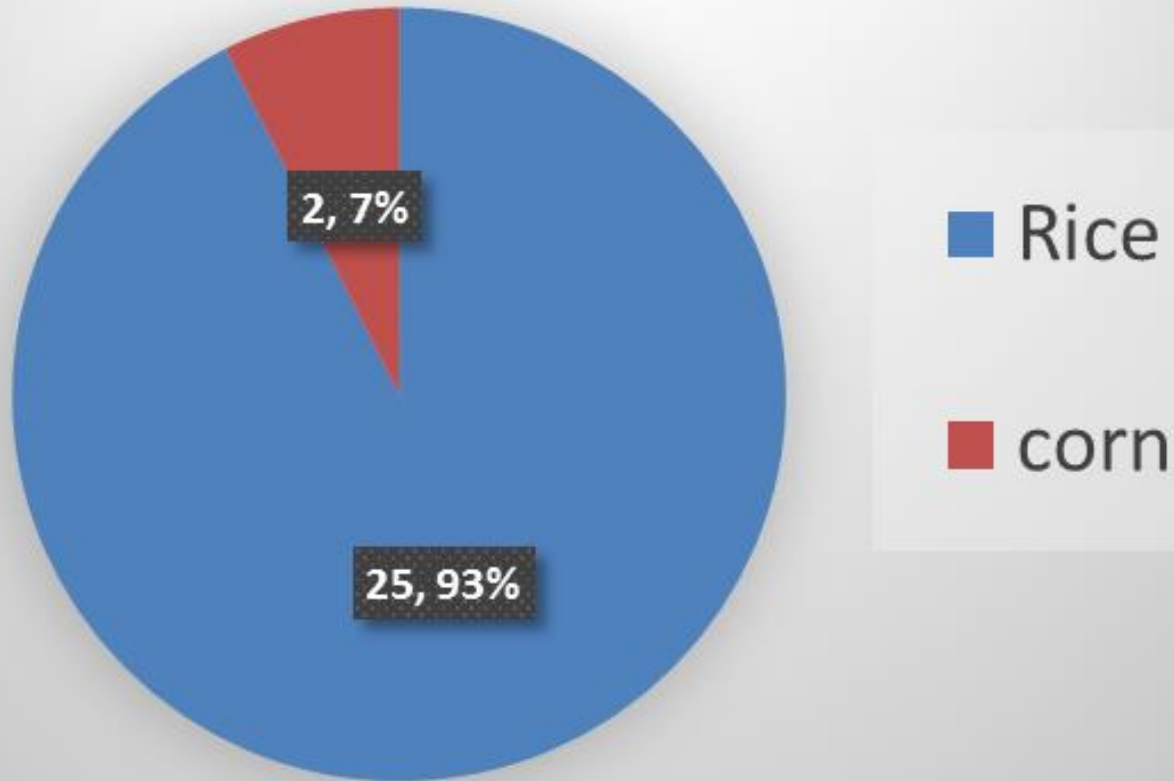




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Grain, % of farmers

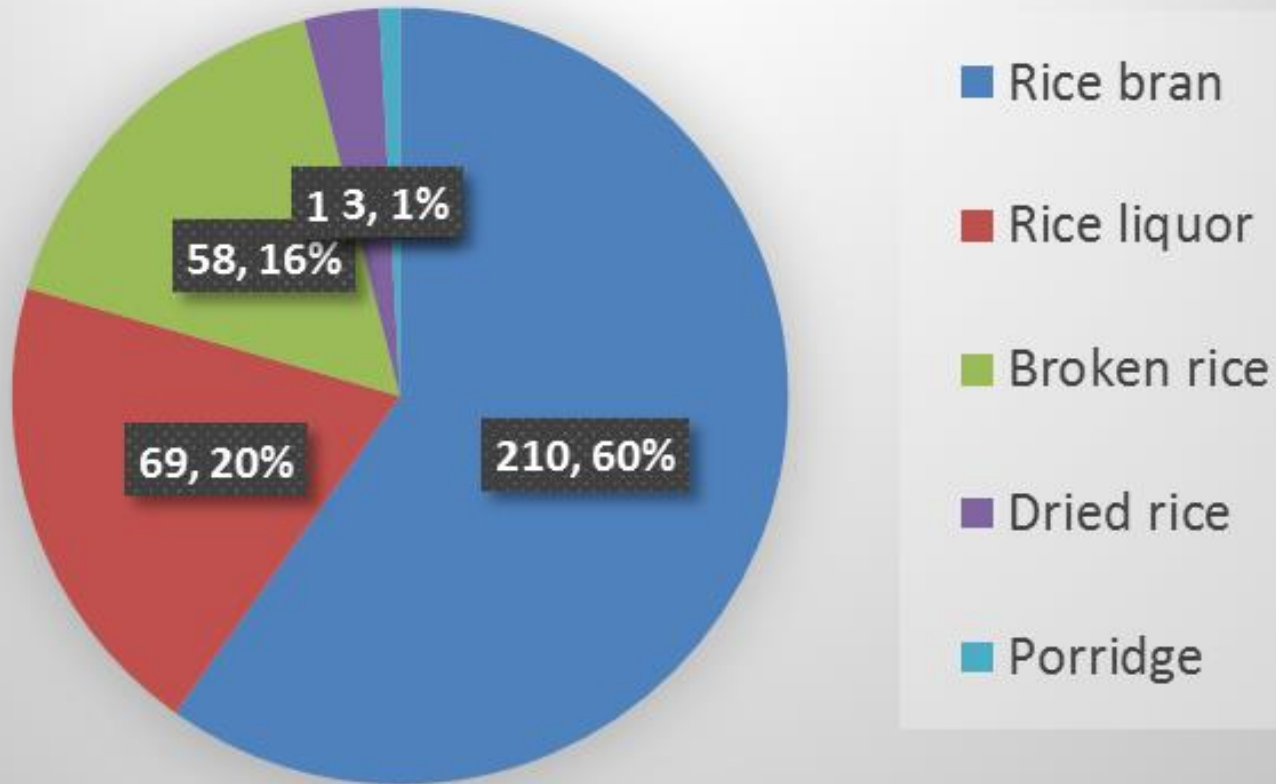




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Grain byproduct, % farmers

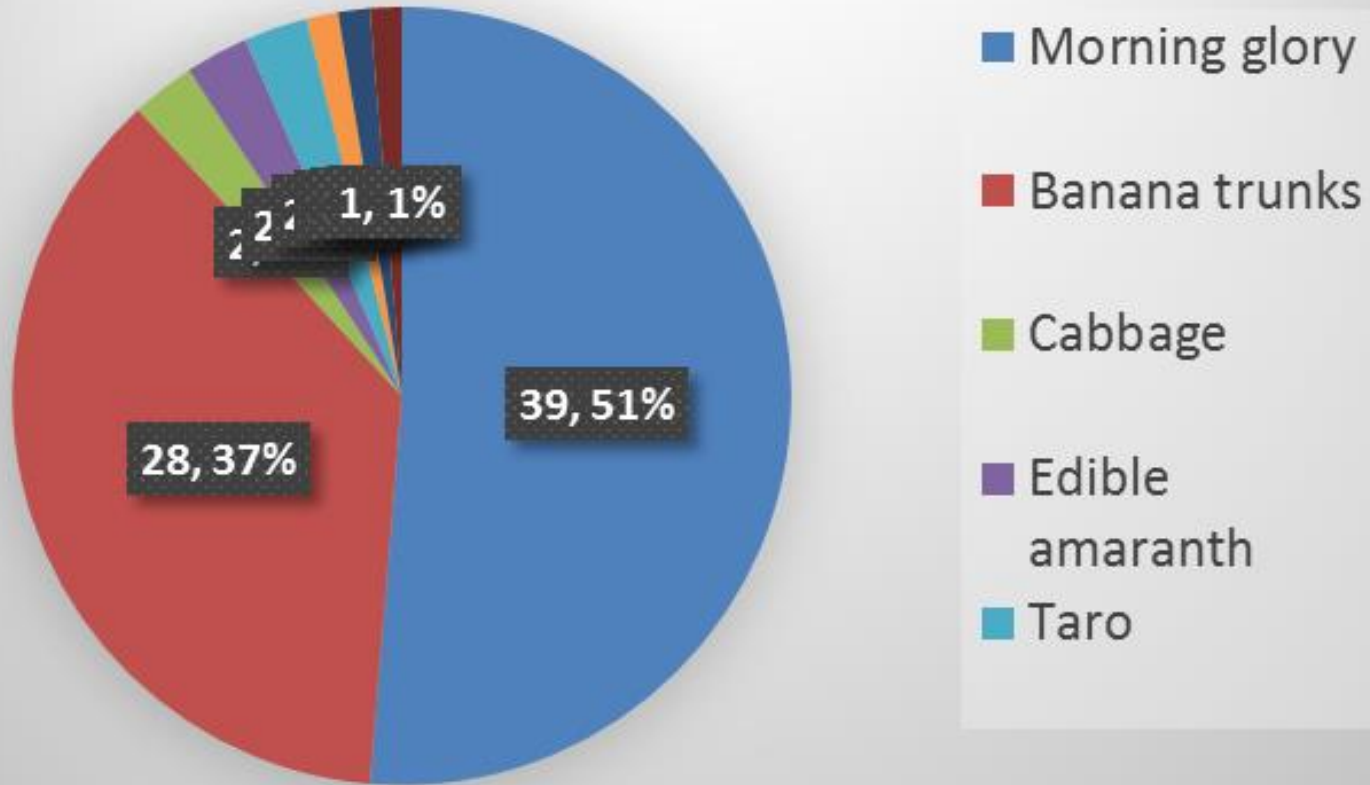




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Home raised plant

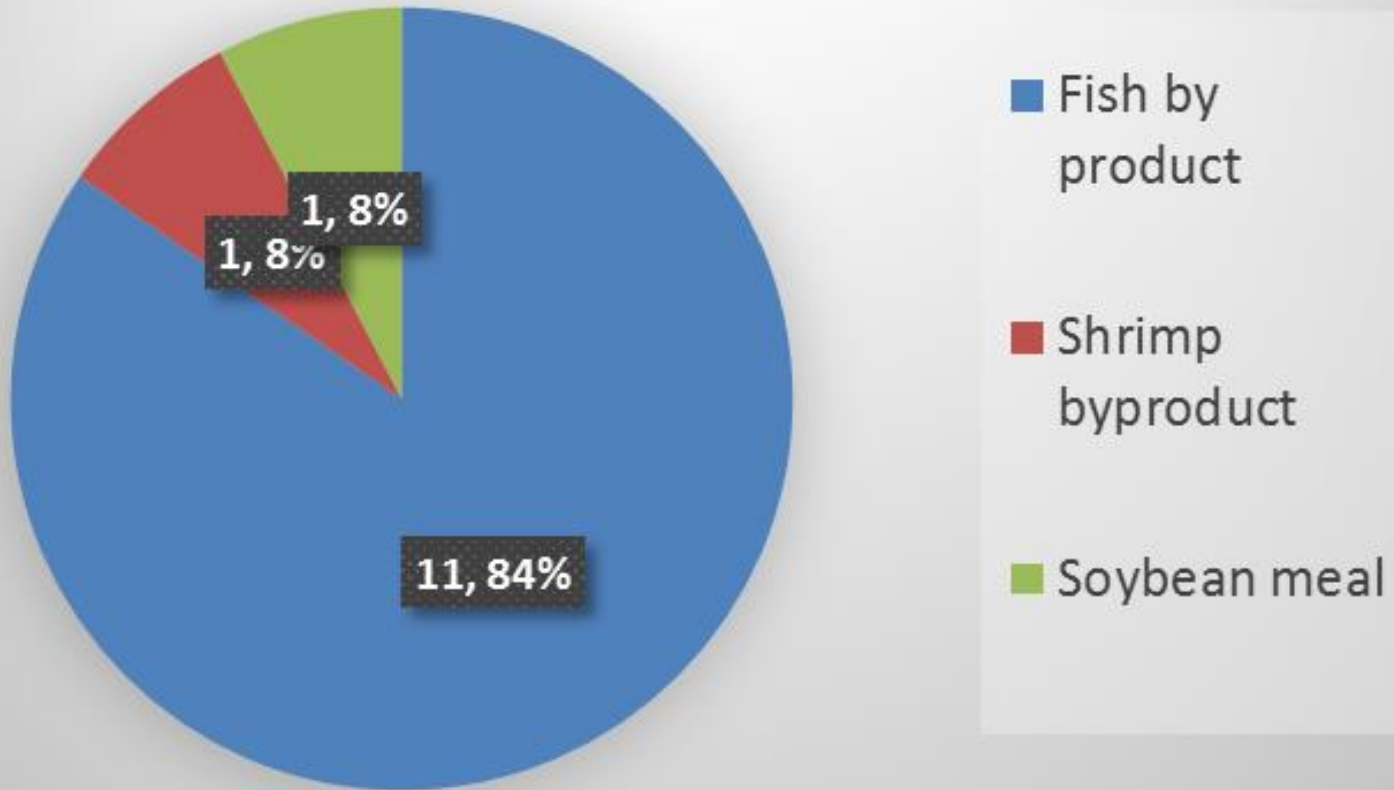




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Protein source

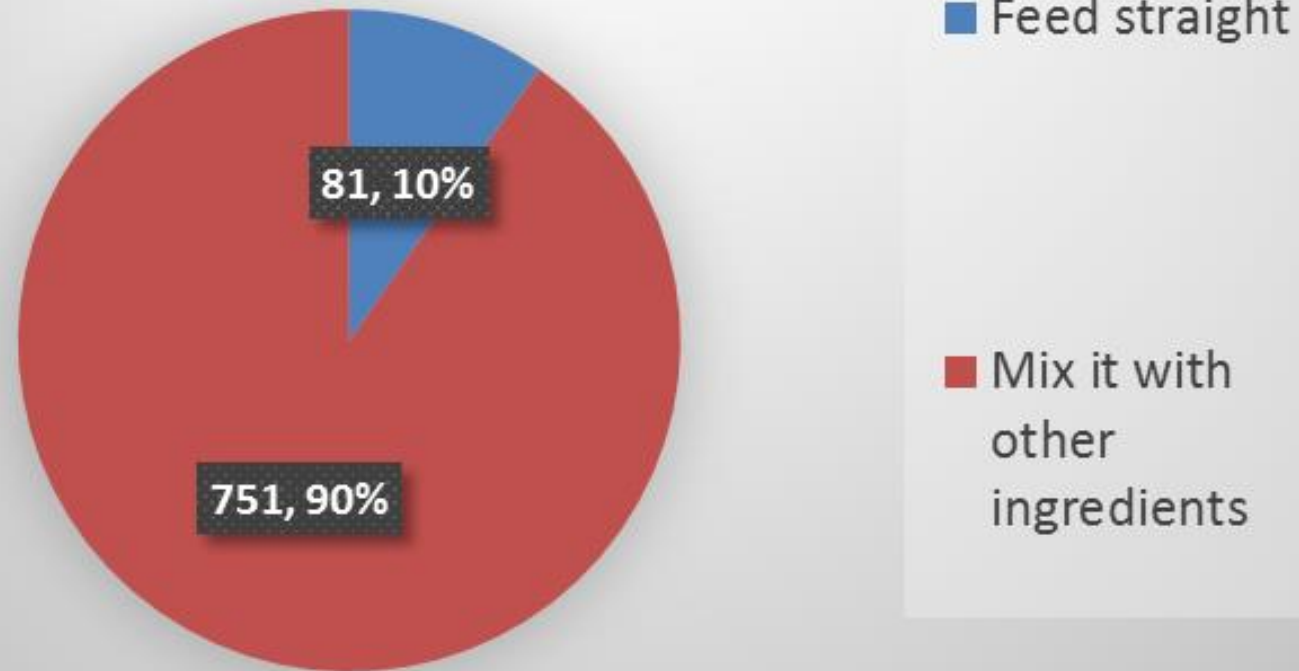




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Do you mix it with anything else of feed straight?

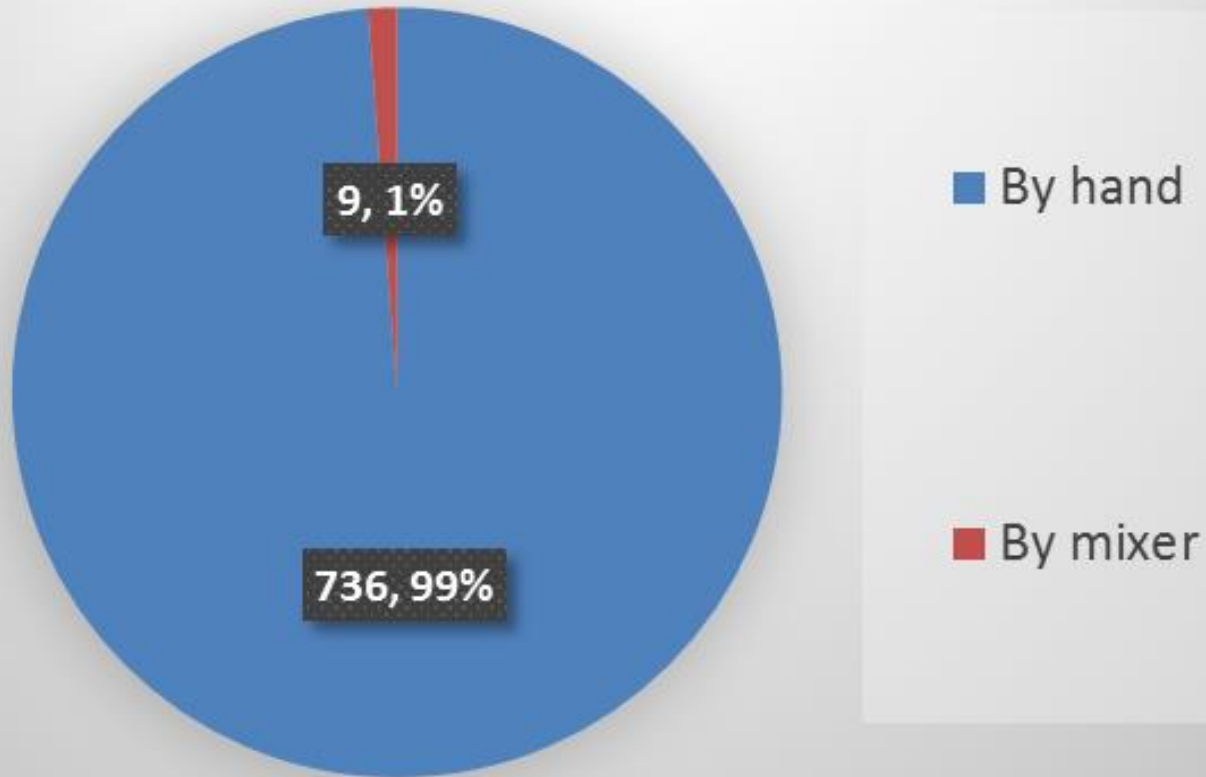




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Mixing method

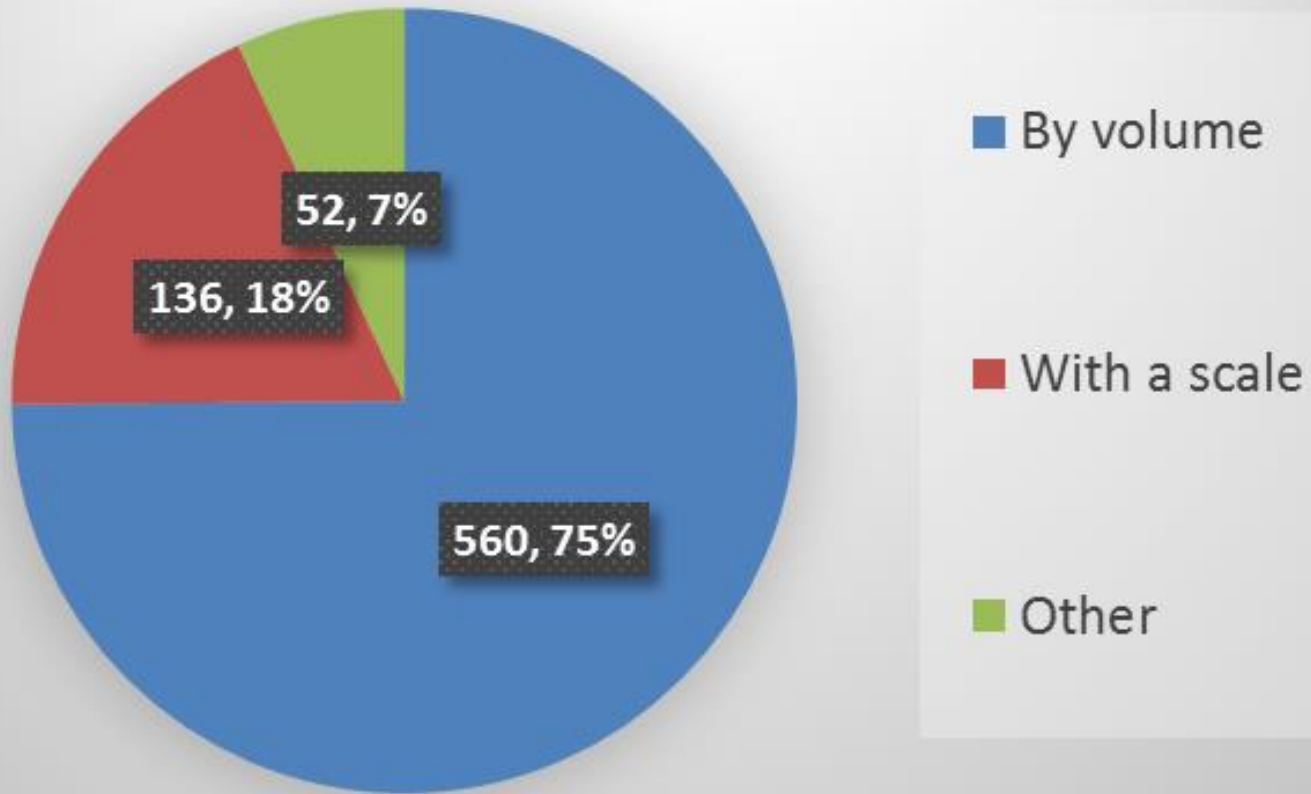




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Mixing measurement

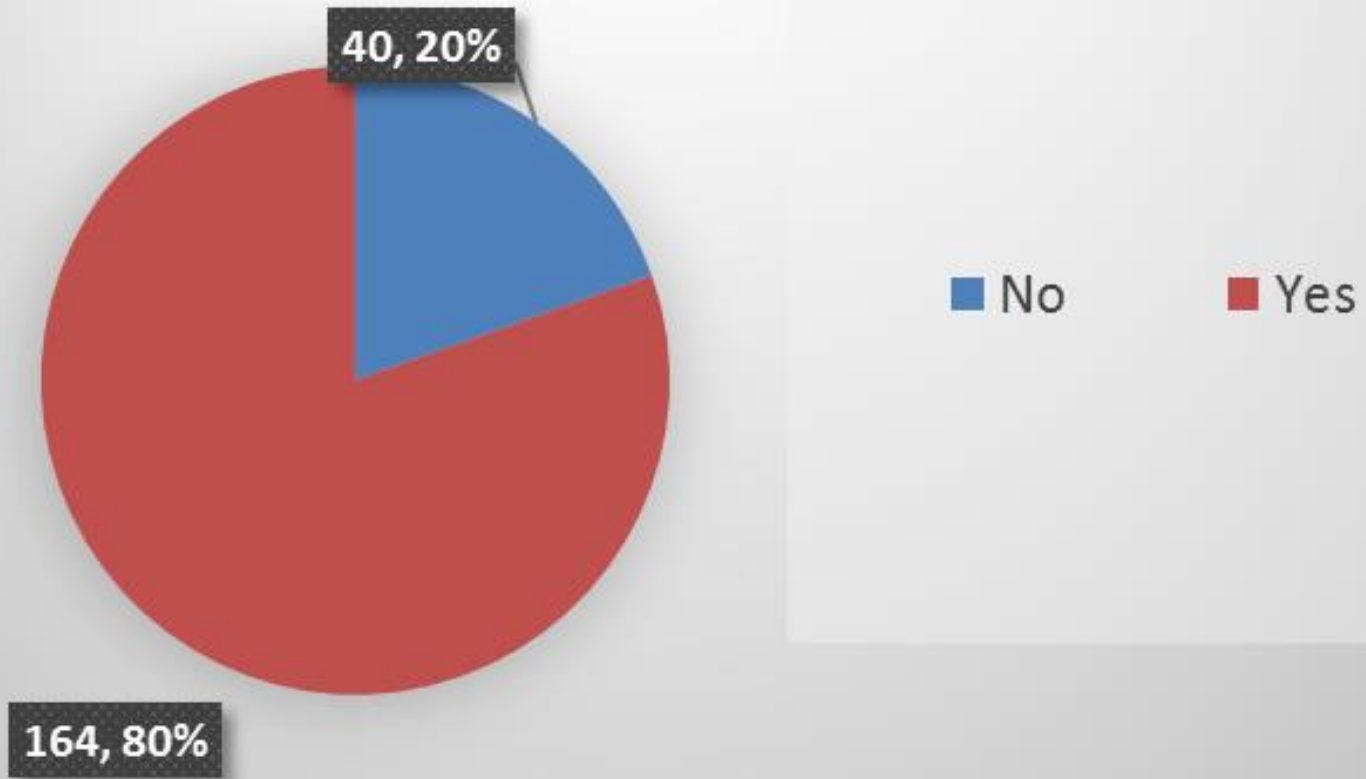




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Do baby pigs receive iron injection at birth?

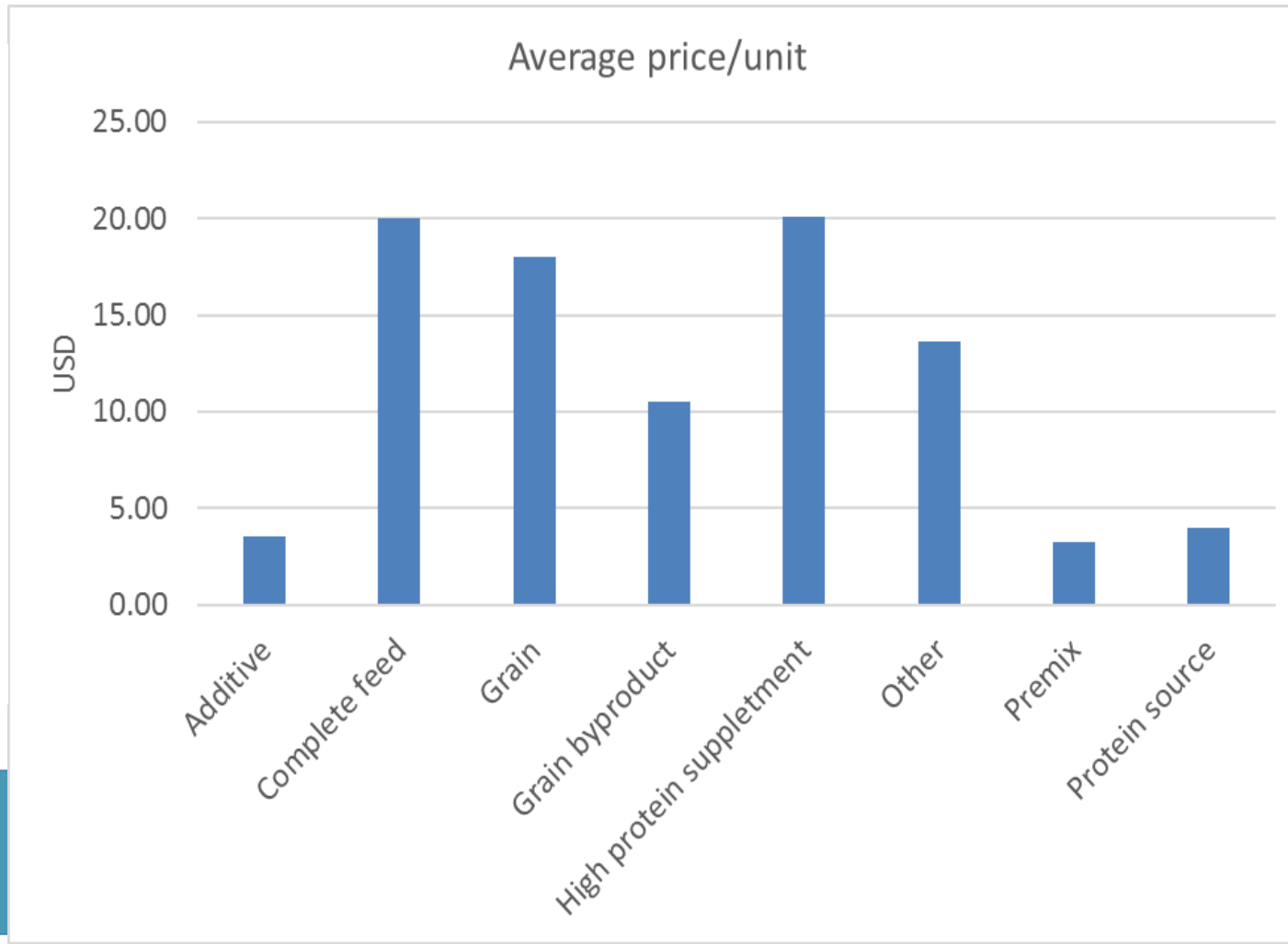




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- Additive: 3.5-4\$/kg
- Complete feed: 20\$/25kg
- Grain: 17-18\$/50kg
- Grain byproduct: 10-11\$/45kg
- High protein supplement: 20\$/20-25kg
- Premix: 2.5-3\$/1kg
- Protein source: 4\$/2.5kg



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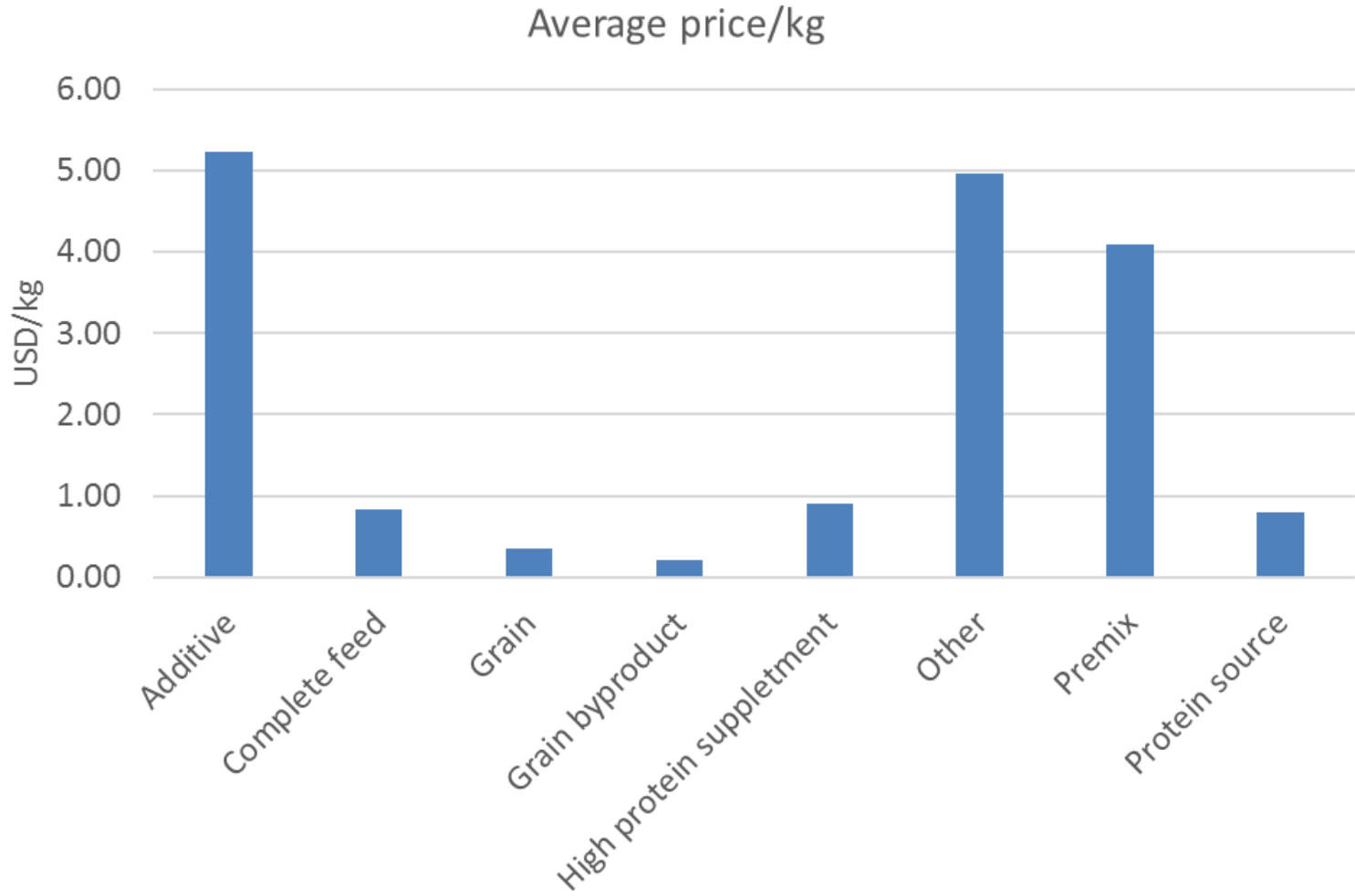


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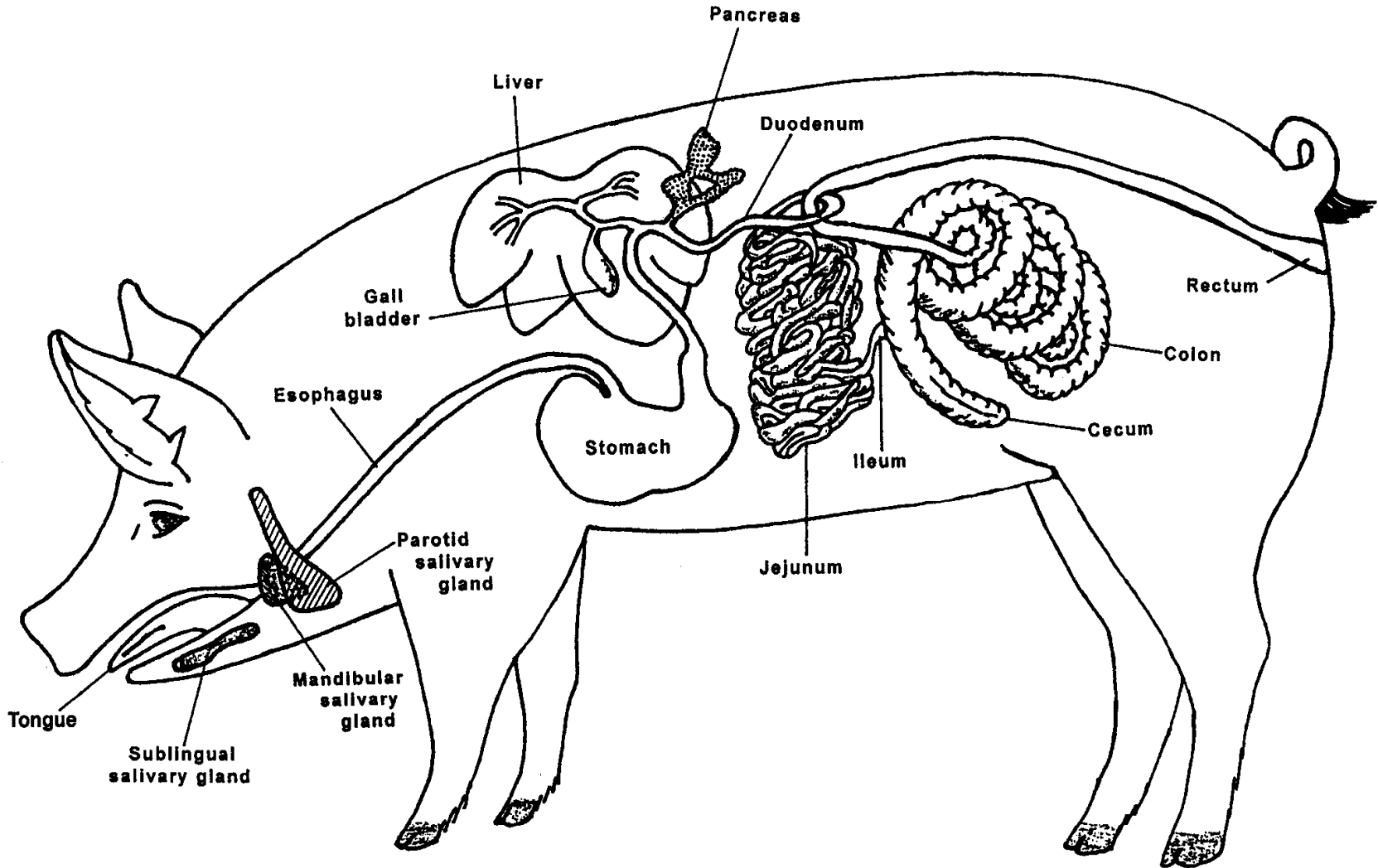


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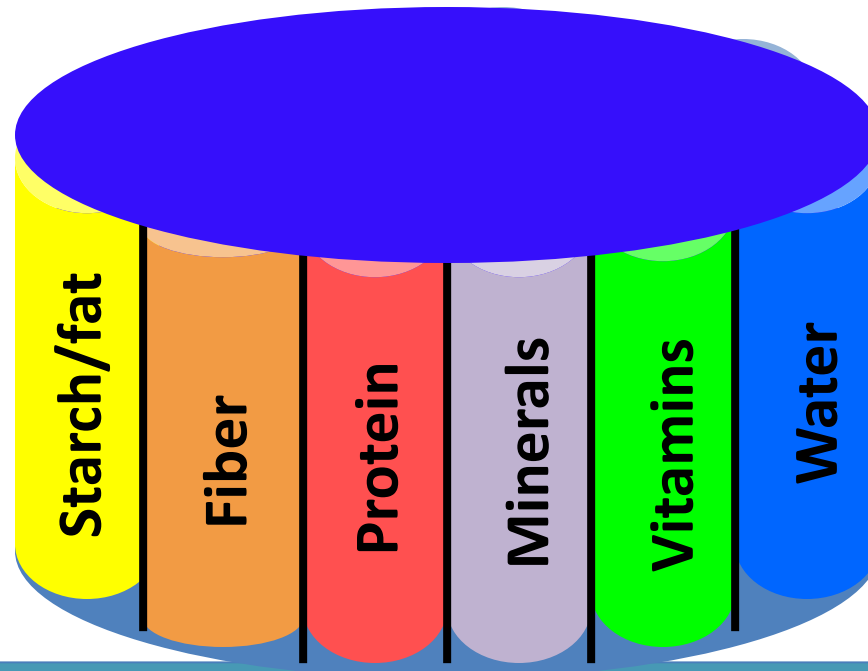
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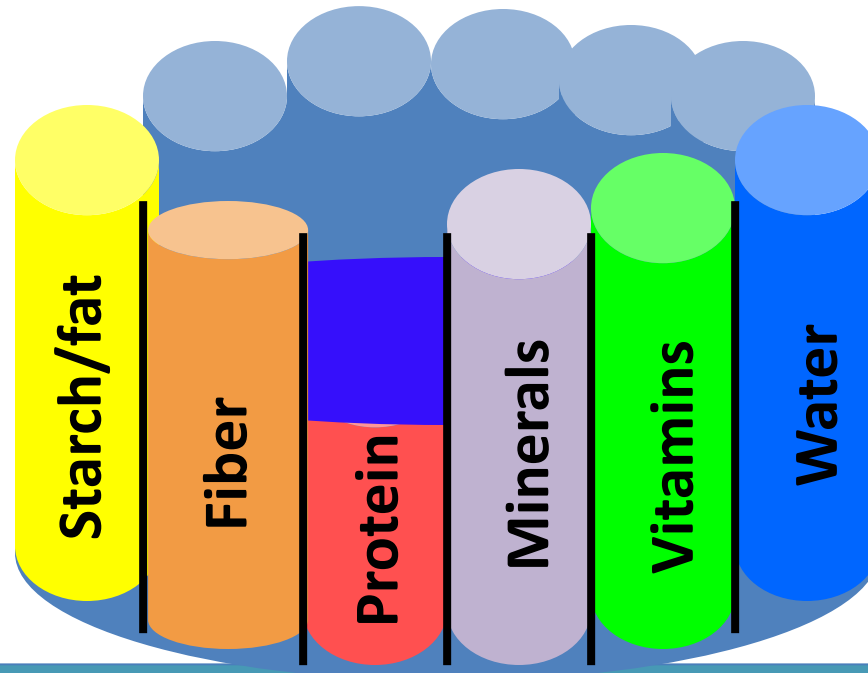
Rain barrel concept for a balanced diet





Rain Barrel Concept

If one is lacking,
performance and
reproduction can
be reduced





Protein and Amino Acids

- Proteins are made up of individual molecules called amino acids
- Amino acids contain nitrogen
- Two to several hundred AA in a chain are called a peptide
- Many peptides in a chain are called proteins
- Non-ruminants (swine, poultry, humans) have dietary requirements for specific amino acids (essential amino acids), thus protein quality is usually of high relative importance.

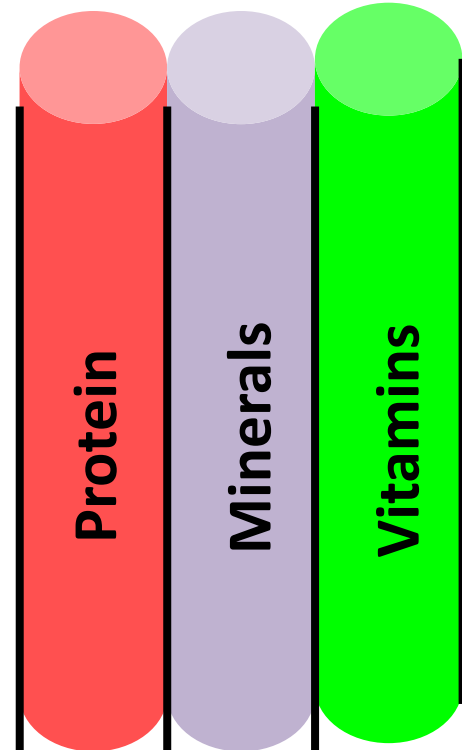
Protein in the diet – this is the nutritional component that meat development in animals come from



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Supplement



32 to 46% Protein





Macro-Minerals

- Calcium
- Phosphorus
- Sodium
- Chlorine/Chloride
- Potassium
- Magnesium
- Sulfur

Trace-Minerals

- Manganese
- Iron
- Zinc
- Copper
- Iodine
- Selenium

Need to be included in the daily diet, ingredients rarely contain enough for optimal body functions



Vitamins

- Essential for regular metabolism in animals and, consequently, required for normal growth, development, maintenance, and reproduction
- Most are not synthesized by the animal in sufficient amounts to meet metabolic needs and, therefore, deficiency symptoms occur if they are deficient in the diet





Types of Vitamins

- Fat Soluble Vitamins— Stored in body fat tissue
 - A, D, E, and K
 - Often found in green leafy forages
 - Daily intake is not necessary
- Water Soluble Vitamins – Not Stored in the Body
 - B-vitamins: biotin, choline, folacin, niacin, pantothenic acid, riboflavin, thiamin, pyridoxine (B₆), and cyanocobalamin (B₁₂)
 - Best if consumed daily



Vitamin Stability

- Vitamins lose 3 to 50% (average 5 to 10%) of their potency with each month of storage
- Vitamin stability and potency decrease with:
 - Storage, sunlight, humidity, exposure to trace minerals
- Must keep the source of vitamins fresh or they will not be active to meet the pigs needs





Vitamin and Mineral Sources

- Supplements – however unknown what vitamins and minerals are included and their concentration
- Premixes – Added to complete diets (very concentrated)
 - NOT RECOMMENDED to add to daily feedings
- Base mix – A combination of macro and micro-minerals, vitamins and may contain some amino acids
 - Can be added to daily feedings

	Inclusion %/tonne	Protein	Vitamins	Macro Minerals	Micro Minerals
Supplement	10-20%	Yes	Maybe	Maybe	Maybe
Vitamin premix	0.2-0.5%	No	Yes	No	No
Mineral premix	0.2-0.5%	No	No	Maybe	Maybe
Base mix	2.5-5.0%	Maybe	Yes	Yes	Yes



Water – The overlooked ingredient?

- Water access to all pigs at all times is critical for optimum growth, reproduction and health
- NEVER limit water consumption
 - Providing water only with daily feedings is not enough
- Must develop water system or always have water in troughs to provide full drinking ability of all classes of swine.





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Pail with water filled daily for pigs to drink from a nipple waterer



Pressurized waterline to a nipple waterer in pig pen





FEED SAMPLES ANALYZED

- Collected 305 feed ingredient samples from farmers
- Analyzed 94 feed ingredients
 - Dry matter, crude protein, crude fiber, ash, ether extract (fat), acid detergent fiber, neutral detergent fiber, calcium, and phosphorus





FEED ANALYSIS: ENERGY SOURCES (DM BASIS)

	Rice bran	Rice mix	Maize	Broken rice	Rice	Banana trunk
Dry matter	92.5	91.6	90.0	90.5	88.4	6.7
Protein	8.6	10.4	8.6	7.5	6.6	3.1
Crude fiber	23.3	8.8	3.1	1.2	0.4	29.9
ADF	34.8	12.2	3.8	2.1	1.1	34.2
NDF	43.2	17.9	11.2	3.5	1.5	47.3
Fat	7.6	9.0	3.3	0.7	0.1	0.7
Ash	13.5	7.3	1.6	0.8	0.4	14.1
Phosphorus	0.92	0.98	0.25	0.12	0.09	0.19
Calcium	0.10	0.19	0.02	0.02	0.02	0.47



FEED ANALYSIS: RICE BRAN SOURCES (DM BASIS)

	Rice bran	Worst	Best	Rice bran #2	Rice bran #3 (most)
Dry matter	92.5	89.6	91.9	92.1	92.6
Protein	8.6	5.9	13.8	11.7	7.3
Crude fiber	23.3	32.4	7.7	17.0	26.2
ADF	34.8	49.8	13.0	24.3	39.4
NDF	43.2	60.3	18.2	34.0	47.6
Fat	7.6	3.7	17.0	9.6	6.3
Ash	13.5	19.3	10.0	11.7	14.3
Phosphorus	0.92	0.50	1.89	1.20	0.77
Calcium	0.10	0.06	0.08	0.24	0.06



FEED ANALYSIS: PROTEIN SOURCES (DM BASIS)

	Rice bran	Supplement	Soybean product	Morning glory	Dried fish head
Dry matter	92.5	91.3	87.5	9.1	90.5
Protein	8.6	44.6	50.3	21.4	42.3
Crude fiber	23.3	4.4	4.1	16.5	5.7
ADF	34.8	9.5	6.2	26.4	7.7
NDF	43.2	14.2	9.1	29.8	14.4
Fat	7.6	3.7	1.4	1.4	13.5
Ash	13.5	15.7	7.6	16.6	31.1
Phosphorus	0.92	1.85	0.81	0.58	2.42
Calcium	0.10	3.31	0.33	0.67	5.74



FEED ANALYSIS RESULTS (DM BASIS)

	Rice bran	“Typical” Complete diet
Dry matter	92.5	91.5
Protein	8.6	19.8
Crude fiber	23.3	2.7
ADF	34.8	4.5
NDF	43.2	6.8
Fat	7.6	4.9
Ash	13.5	6.3
Phosphorus	0.92	0.74
Calcium	0.10	0.76



SWINE RESEARCH IN CAMBODIA

- **Objective**: Evaluate restricted feeding level and morning glory on growth performance of pigs.
- **Treatments**
 - Complete feed fed ad libitum
 - Diet 1 fed at 75% of daily intake
 - Treatment 2 with ad libitum morning glory
- 60 pigs, start weight 17 kg, fed for 42 days at a local producer facility

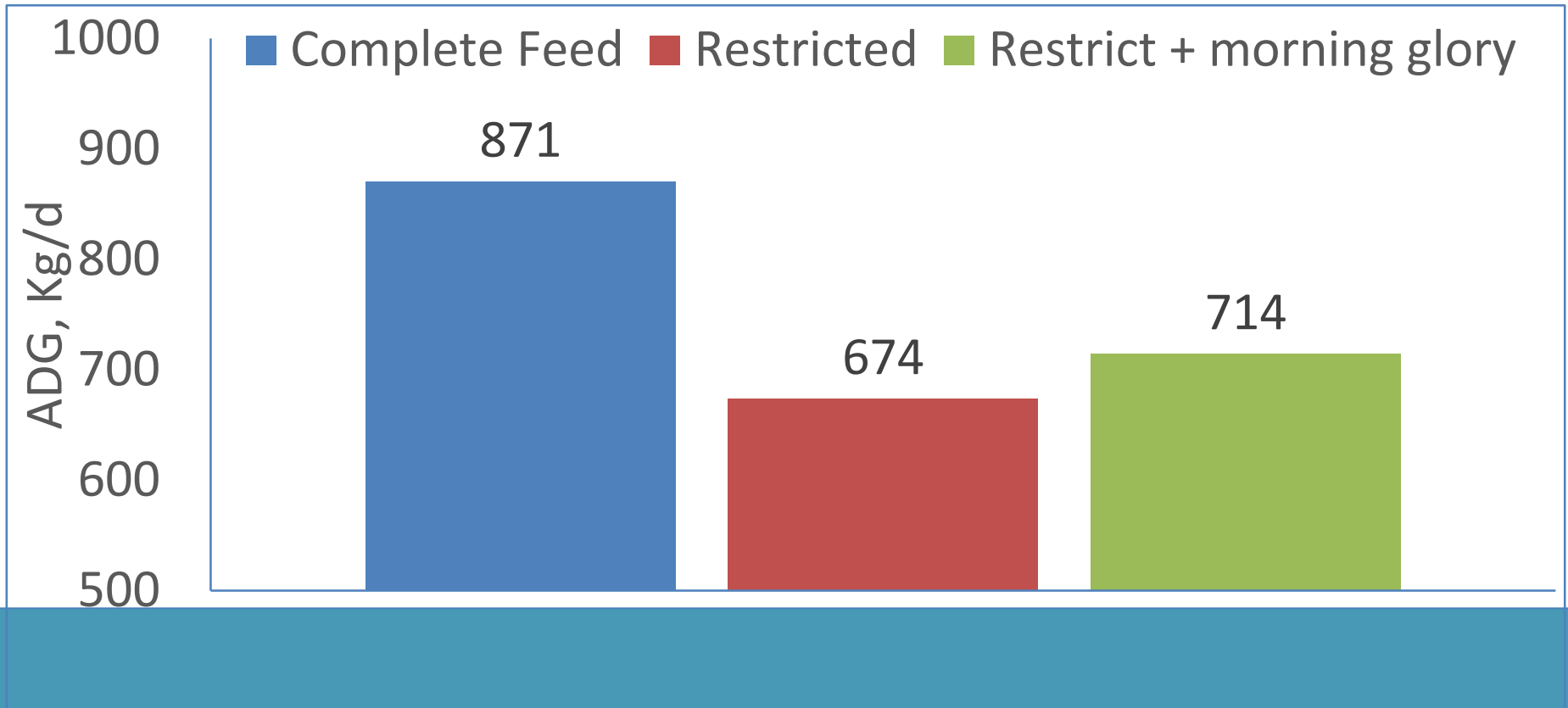




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DAY 0 - 42 ADG, KG/D



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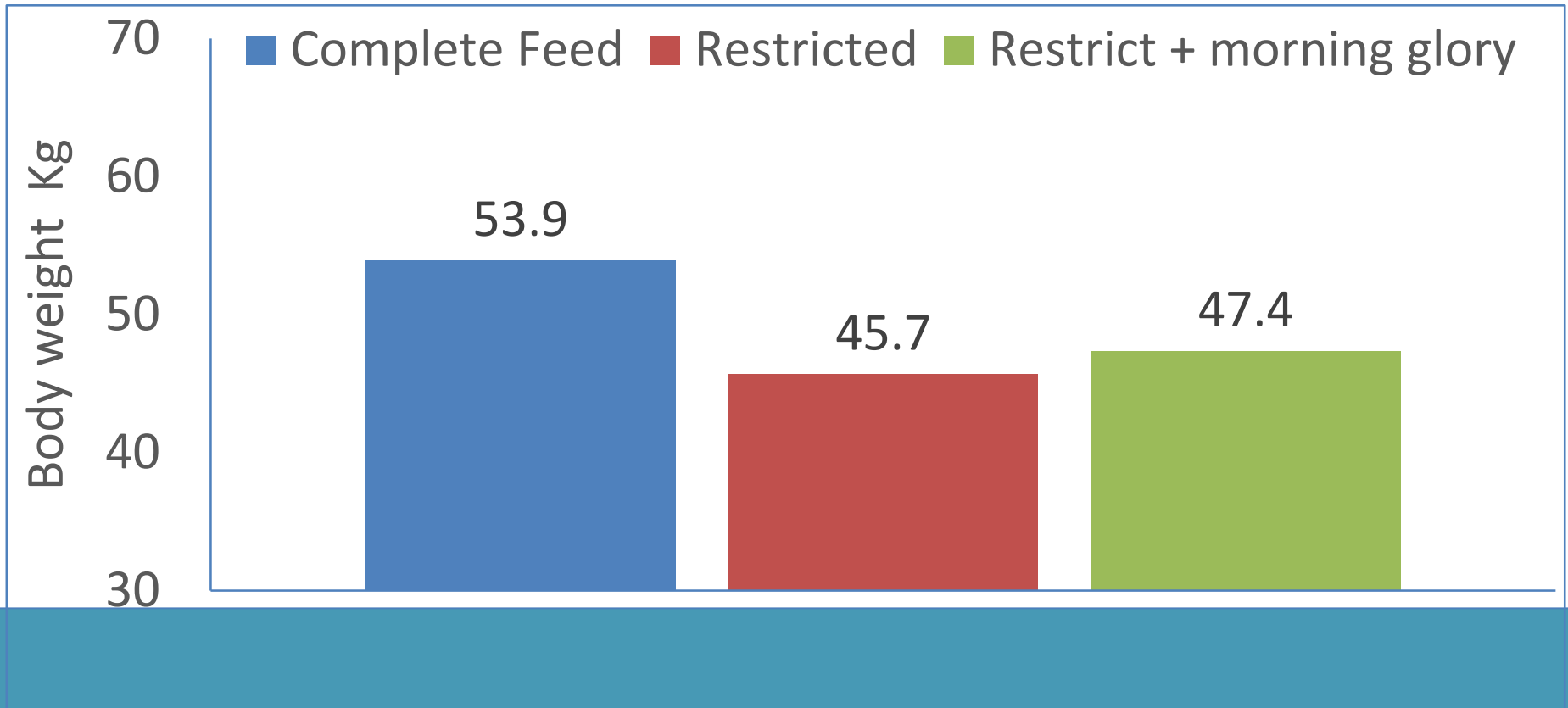
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DAY 42 BODY WEIGHT, KG

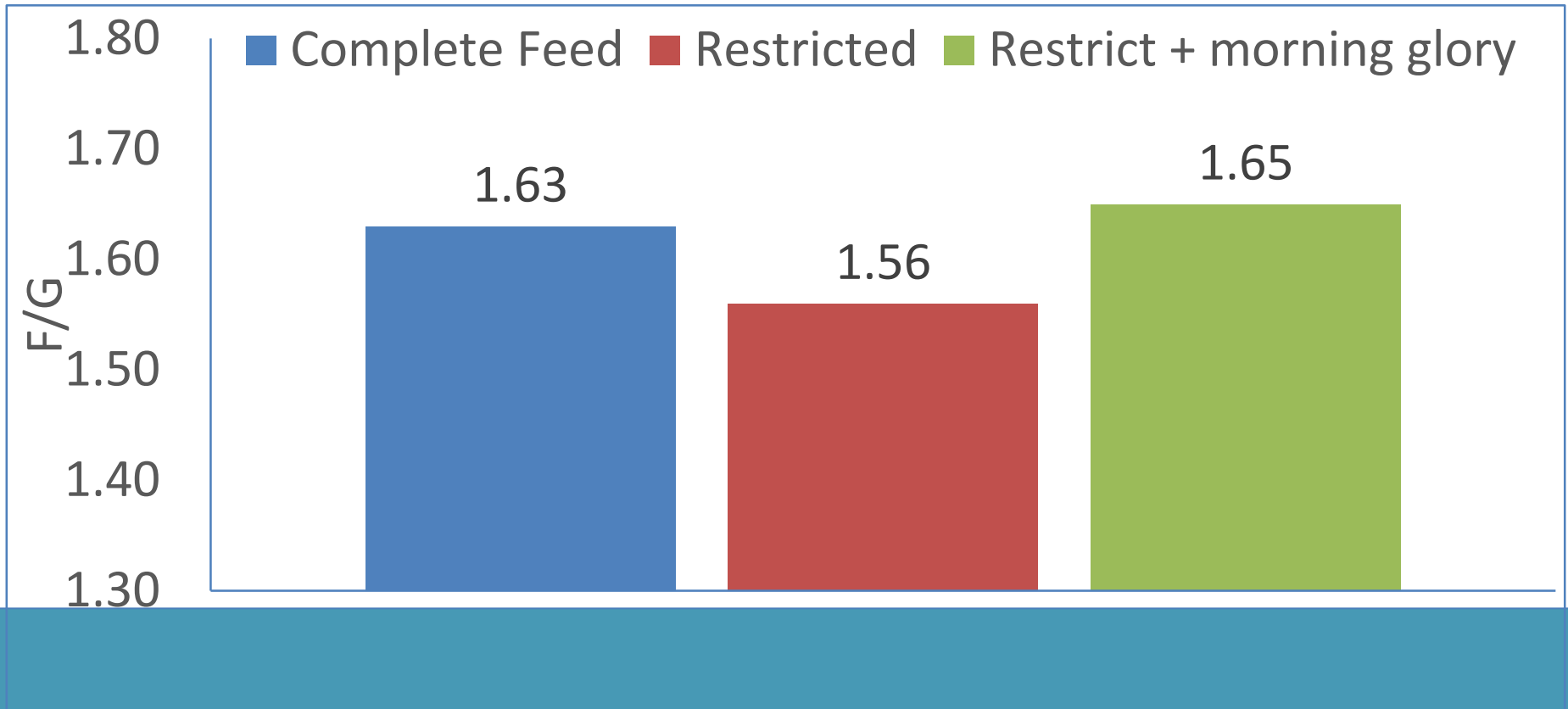




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DAY 0 TO 42 F/G



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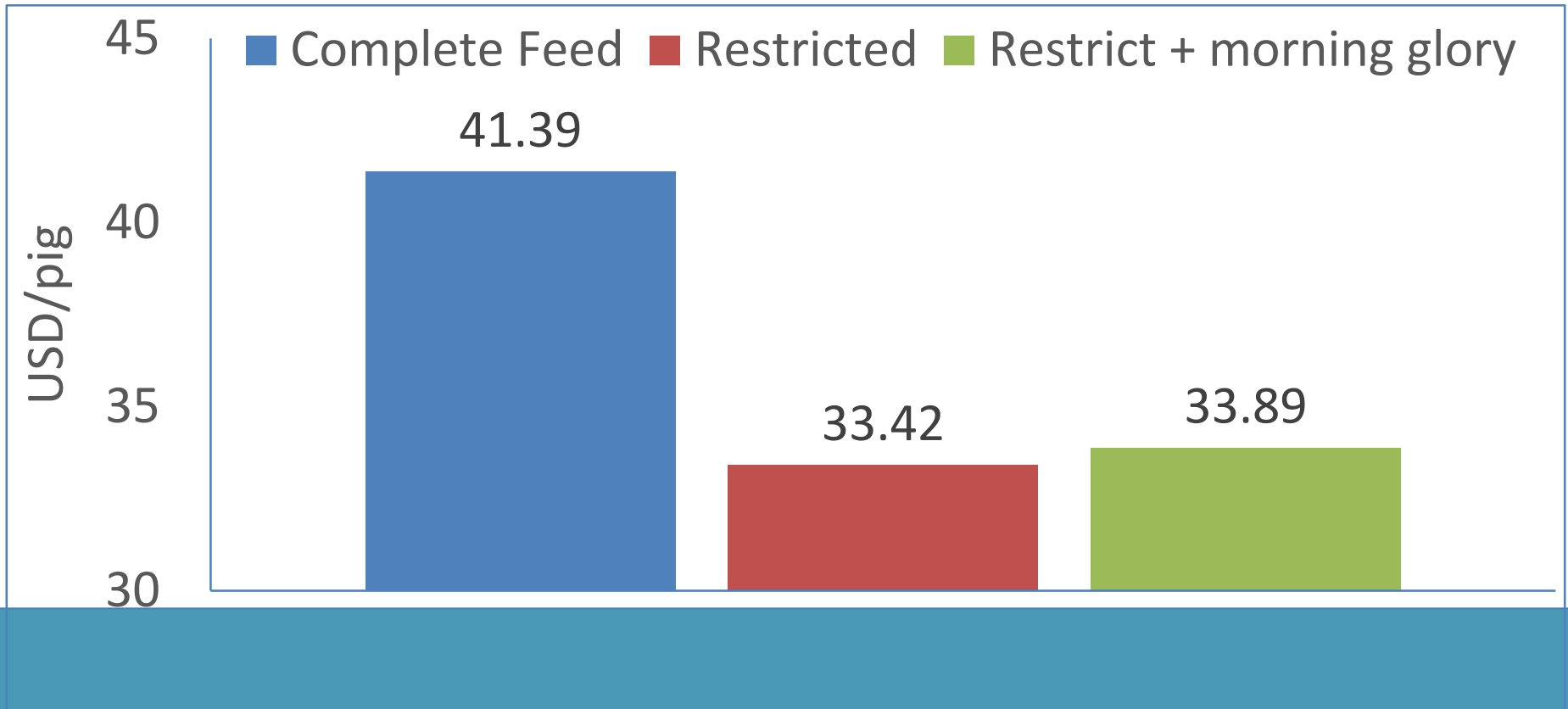
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INCOME OVER FEED COST, USD/\$





SWINE RESEARCH IN CAMBODIA

- **Objective**: Evaluate dietary supplement, base mix, and/or soybean meal on growth performance of growing pigs.
- **Treatments**
 - Supplement 100% recommended - Supplement 20% of diet with rice bran (80% of ration)
 - Supplement 25% recommended - Supplement 5% of diet (locally practiced) with rice bran (95% of ration)
 - Base mix – Base mix (2.5% of ration) with rice bran (97.5% of ration)
 - Base mix + Soybean meal – Base mix (2.5% of ration), soybean meal (5% of ration), and rice bran (92.5% of ration)
- 60 pigs, start weight 56 kg, fed for 42 days at a local producer facility

SOW BASE MIX

COMPOSITION IN 1 KG

Vitamin A	: 206 250 IU/kg	Folic Acid	: 56 mg/kg	Se (Na ₂ SeO ₃)	: 7.4 mg/kg
Vitamin D3	: 42 200 IU/kg	Vitamin B6	: 28 mg/kg	I (Ca(IO ₃) ₂ ·H ₂ O)	: 7.4 mg/kg
Choline	: 13 700 mg/kg	Biotin	: 5.6 mg/kg	Lysine (L-Lysine HCl)	: 3.3 %
Vitamin E	: 1 690 mg/kg	Vitamin B12	: 850 mcg/kg	Methionine (DL-Methionine)	: 0.95 %
Vitamin B3	: 1 240 mg/kg	Fe (FeSO ₄ ·H ₂ O)	: 2 750 mg/kg	Threonine (L-Threonine)	: 3.3 %
Vitamin B5	: 685 mg/kg	Zn (ZnO)	: 2 750 mg/kg	Calcium (CaCO ₃)	: 20 %
Vitamin B2	: 206 mg/kg	Mn (MnO)	: 825 mg/kg	Digestible Phosphorus (DCP)	: 5.6 %
Vitamin K	: 84 mg/kg	Cu (CuSO ₄ ·5H ₂ O)	: 415 mg/kg	Salt (NaCl)	: 12.5 %
				Carrier (Rice hull)	: q.s to 1kg

INGREDIENTS:

Vitamin A, D3, E, B3, B5, B2, K, B6, B12, Choline Chloride, Folic Acid, Biotin, Ferrous Sulfate, Zinc Oxide, Manganese Oxide, Copper Sulfate, Sodium Selenite, Calcium Iodate, L-Lysine HCl, DL-Methionine, L-Threonine, Limestone, DCP, Sodium Chloride, Rice hull.

INDICATION

Supplement essential vitamins, minerals and amino acids for Sow.

USAGE

Mix 36.3 kg SOW BASE MIX / ton of complete feed for sow.

STORAGE: stored in dry and cool place.

The color does not effect the quality.

Contains no hormones, antibiotics or medicines

Lot :

Production date : Check NSX/MFD on the packaging

Expiry date : Check HSD/EXP on the packaging



Net Weight
25 kg

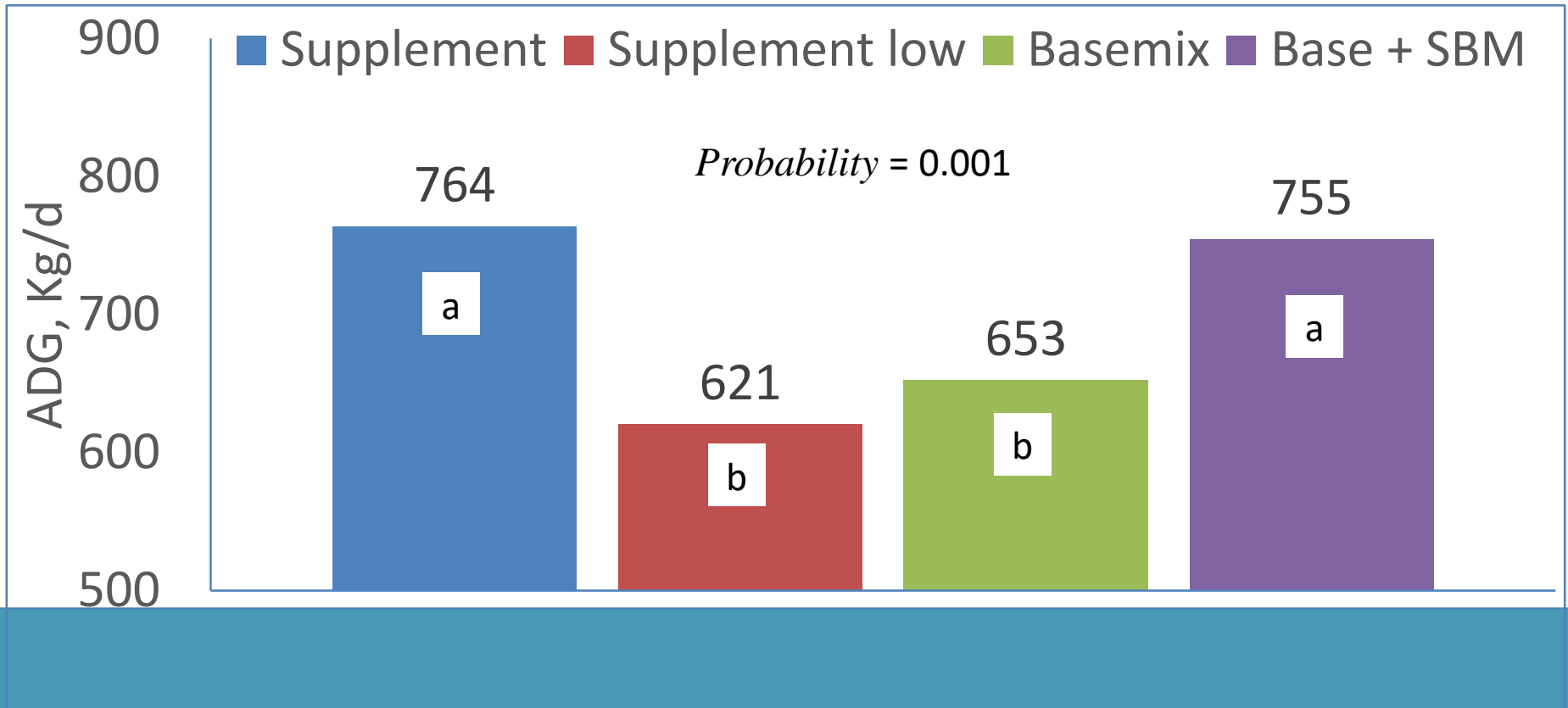
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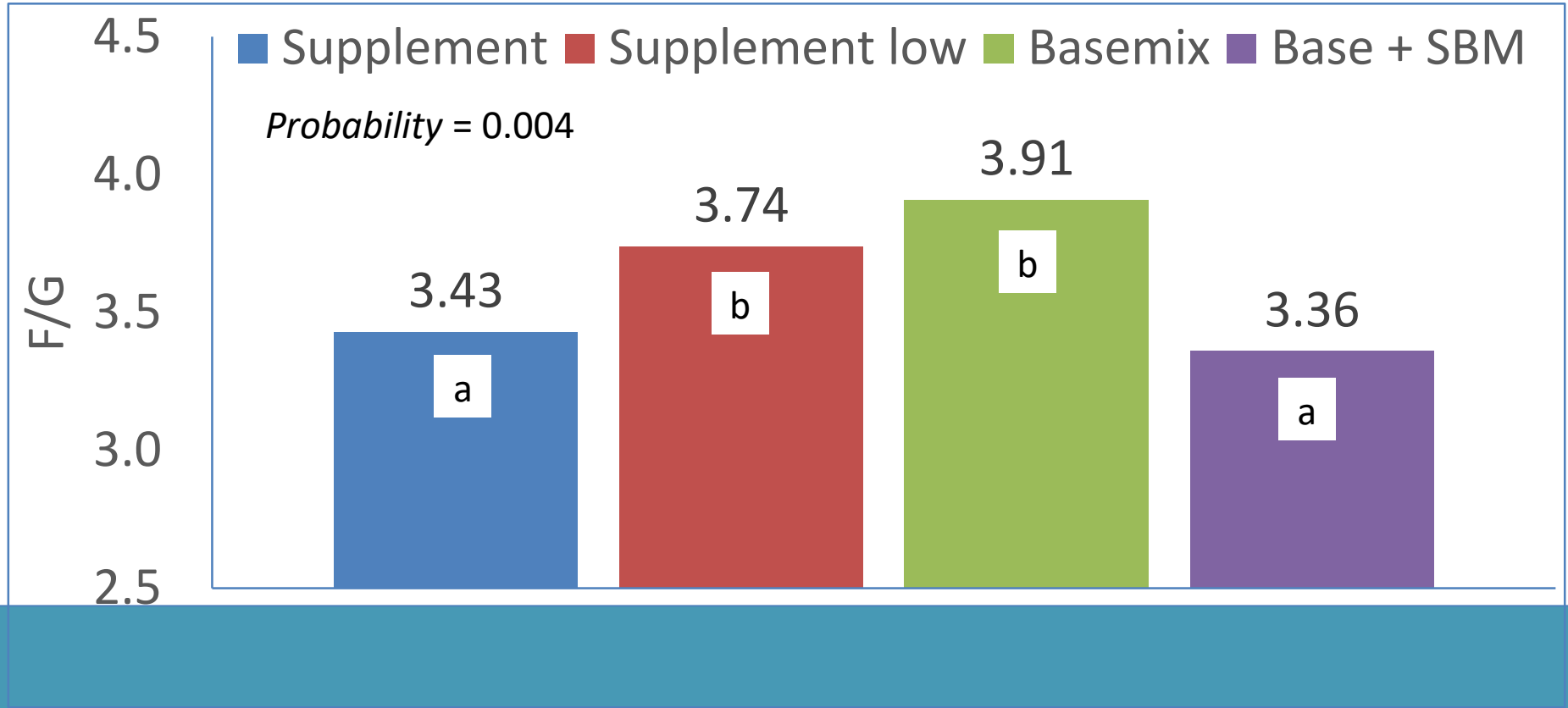




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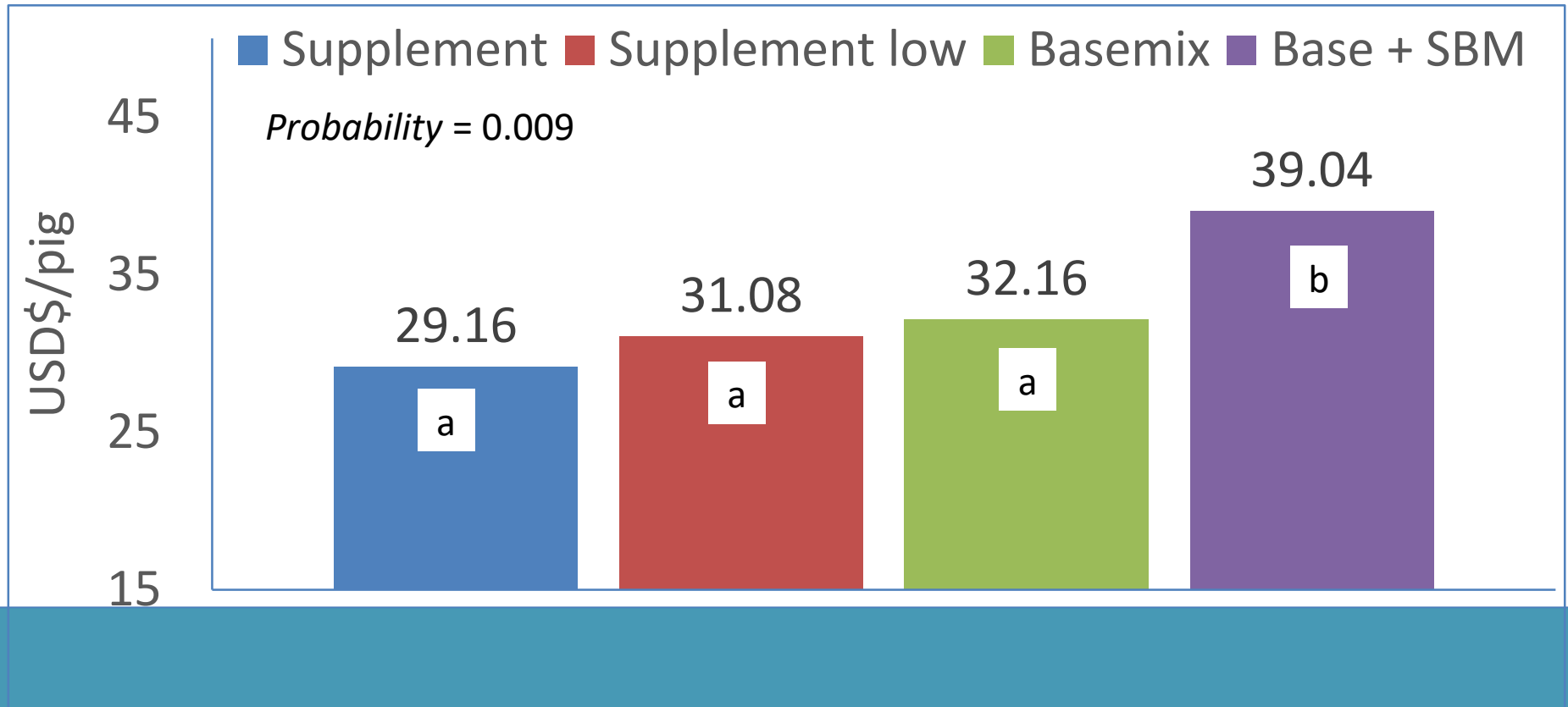
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INCOME OVER FEED COST, USD\$/PIG





ADDITIONAL CAMBODIA SWINE RESEARCH

- Complete feed containing soybean meal vs. supplement with rice bran in growing swine and chickens
 - Conducted at CE SAIN technology parks in Siem Reap and Battambang.
 - Funded by American Soybean Association.
- Feeding swine breeding herd a mineral and vitamin supplement: farmer demonstration project
 - Conducted on 28 farms in Siem Reap and Battambang.





TAKE-HOME MESSAGES

- Many small and medium sized swine farmers feed diets deficient in protein, vitamins and minerals
- Survey revealed farmers do not follow recommendations when using supplements for swine
- Rice bran is the most widely used ingredient and quality varies widely
- The use of a base mix and soybean meal mixed with local feed ingredients holds tremendous opportunity for Cambodia swine farmers to improve pig growth and profitability

